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e undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) e Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of Comptroller-General, hereby certify that annexed hereto is a true copy of the documents iginally filed in connection with patent application GB0122084.7 filed on 13 September

cordance with the Patents (Companies Re-registration) Rules 1982, if a company named s certificate and any accompanying documents has re-registered under the Companies 980 with the same name as that with which it was registered immediately before re- ration save for the substitution as, or inclusion as, the last part of the name of the words ic limited company" or their equivalents in Welsh, references to the name of the any in this certificate and any accompanying documents shall be treated as references to me with which it is so re-registered.

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istration under the Companies Act does not constitute a new legal entity but merely ts the company to certain additional company law rules.

Signed William Morell

Dated 1 May 2009

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The Patent Office

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13 SEP 2001
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Request for grant of a patent

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The Patent Office

Cardiff Road
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South Wales
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13SEP01 E659534-2 C7595
P01/7700 0.00-0122084.7

1. Your reference

2. Patent application number
(The Patent Office will fill in this part)
13 SEP 2001
0122084.7

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*
DANIEL JAMES PLANT
LLANWINNEY FARM
LLANGOVAN
NR MONMOUTH
NP25 4BU

Patents ADP number *(if you know it)*
07980300 1

If the applicant is a corporate body, give the country/state of its incorporation

4. Title of the invention
ENERGY ABSORBING SHEET.

5. Name of your agent *(if you have one)*
DANIEL JAMES PLANT
LLAN WINNEY FARM
LLANGOVAN
NR MONMOUTH
NP 25 4BU

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*
Venner, Shipley & Co.
20 Little Britain
LONDON
EC1A 7DH.

Patents ADP number *(if you know it)*

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number

Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application	Date of filing *(day / month / year)*

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:*
a) any applicant named in part 3 is not an inventor, or
b) there is an inventor who is not named as an applicant, or
c) any named applicant is a corporate body.
See note (d))

Patents Form 1/77

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Continuation sheets of this form	
Description	2
Claim *(s)*	
Abstract	
Drawing *(s)*	2 only

10. If you are also filing any of the following, state how many against each item.

Priority documents	
Translations of priority documents	
Statement of inventorship and right to grant of a patent *(Patents Form 7/77)*	
Request for preliminary examination and search *(Patents Form 9/77)*	
Request for substantive examination *(Patents Form 10/77)*	
Any other documents *(please specify)*	

11. I/We request the grant of a patent on the basis of this application.

Signature Dan Plant Date 12/9/2001

12. Name and daytime telephone number of person to contact in the United Kingdom DAN PLANT 01600 860 350

Warning

After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under Section 22 of the Patents Act 1977. You will be informed if it is necessary to prohibit or restrict your invention in this way. Furthermore, if you live in the United Kingdom, Section 23 of the Patents Act 1977 stops you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.

Notes

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d) If you have answered 'Yes' Patents Form 7/77 will need to be filed.

e) Once you have filled in the form you must remember to sign and date it.

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Energy Absorbing Sheet.

Body impact protection solutions currently available are limited because they are either based upon a rigid exterior shell (for example as used in roller blade pads), that are uncomfortable to wear, or upon some form of foam laminate (as used in ski pad inserts), which provide poor levels of protection. A protective member is known from Us 5138722 in which an energy absorbing material is contained in an envelope, the material remaining soft and flexible until it is subjected to an impact when its characteristics change rendering it temporarily rigid.

It is the object of the present invention to provide an energy absorbing sheet that is both flexible and lightweight and would produce a sheet form for body impact solutions. It is a further object of the invention to provide an energy absorbing sheet that can be permanently attached and tailored into a garment of part thereof. It is a further object of the invention that the sheet could be simple to cut into the required size and shape, and subsequently attached within or onto the garment.

According to the invention there is provided a sheet comprising of an energy absorbing material in the form of a 'thread' that may be woven or coiled into a sheet. The material is extruded in thin tubes, either hollow or solid. This material could then skin over when exposed to the appropriate conditions, in the same way that an open container of paint would skin over when left in contact with air. The thread would then consist of a tube of energy absorbent material encapsulated in a thin skin of the same material. A further way of producing this thread form of material is to encapsulate the energy absorbent material by co-extrusion within a suitable encapsulant. This could be done in a similar way to the way that insulated electrical wires are manufactured.

The extruded or co-extruded material could then be woven or coiled into a sheet form. This could be on a scale as large as a wicker basket, or as small as some of the new microfibres. It could be woven as the central structural part of some of the latest spacer fabrics, where the spacing thread is in the form of these thin extrusions. The thread could be woven into the spacer fabric in a zigzag pattern, or in coils within the spacer fabric.

The energy absorbing sheet of textile containing the extrusions or co-extrusions, would remain soft and flexible until subjected to an impact when its characteristics change rendering it temporarily rigid, the sheet returning to its normal flexible state after said impact.

Preferably the energy absorbing material within the co-extrusions absorbs the impact force and spreads the load thereof during the impact. Preferably the energy absorbing material within the co-extrusions is a strain rate sensitive material such as a dilatent compound whose mechanical characteristics change upon impact. The preferred material would be a lightweight version of the strain rate sensitive material including dualite spheres. The preferred material is a Dimethyl siloxane hydroterminated polymer such as the material sold by Dow Corning under the Catalogue or trade number 3179 or lightweight version thereof.

Preferably the extrusions or co-extrusions of the material that are not encapsulated but are contained by there own skin are made from a dilatent compound, or derivative thereof. This skin could form by exposing the raw modified dilatent to the correct conditions. For example exposing the material to air, or dipping the material in another material, or exposing the material to ultraviolet light, thus causing a skin to be formed. The family of silicone compounds are known to form a skin but still remain flexible at the core. One example of this would be standard silicone sealant.
Several embodiments of the invention will now be described, by way of example only with reference to the accompanying drawings.

Figure 1 is a perspective view of one form of the extrusion
Figure 2 is a perspective view of one form of the co-extrusion.
Figure 3 is a perspective view of one form of the hollow extrusion
Figure 4 is a cross section woven spacer sheet in zigzag form.
Figure 5 is a cross section view of the woven spacer sheet in coiled form.

Figure 1 shows extrusion 1 which comprises of an energy absorbing material 2, encapsulated by its own skin 3. This could be extruded as normal but could be another continuous extruded shape.

Figure 2 shows extrusion 4 which comprises of an energy absorbing material 2. Encapsulated by material 5. This could be extruded as normal but could be another continuous extruded shape.

Figure 3 shows extrusion 6 which comprises of an energy absorbing material 2, with a hollow 7. This could be extruded as normal but could be another continuous extruded shape. A further embodiment of the invention could include using gas at above atmospheric pressure to fill the hollow. Preferably this gas would be air.

Figure 4 shows another embodiment where the extrusions, as shown in either Figure 1,2 or 3, form a zigzag shape in the centre of a spacer material 8. The zigzag shape 9 is shown only in the weft but in another embodiment could be used in the warp and the weft. The materials on either side have been represented by the sheets 10. This material is preferably a textile. The spacer textile technology already available on the market can produce such multi layers of materials. The textile on either side would bind the sheet together.

Figure 5 shows another embodiment where the extrusions, as shown in either Figure 1,2 or 3, form a coiled shape 11 in the centre of a spacer material 12. The coiled shape is shown only in the weft but in another embodiment could be used in the warp and the weft. The materials on either side have been represented by the sheets 10. This material is preferably a textile. The spacer textile technology already available on the market can produce such multi layers of materials. The textile on either side would bind the sheet together.

FIG. 1

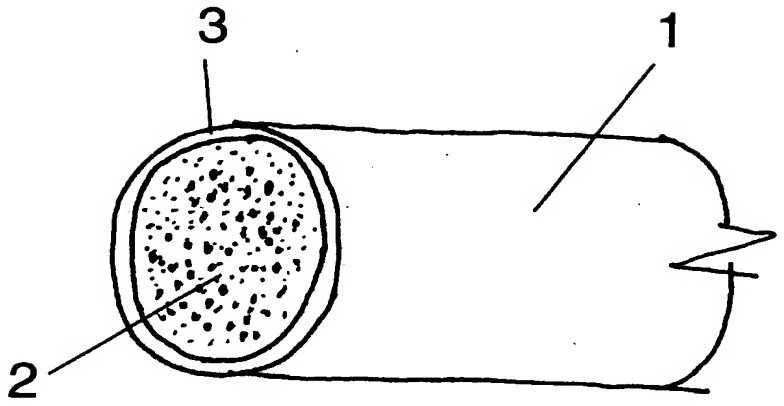

FIG. 2

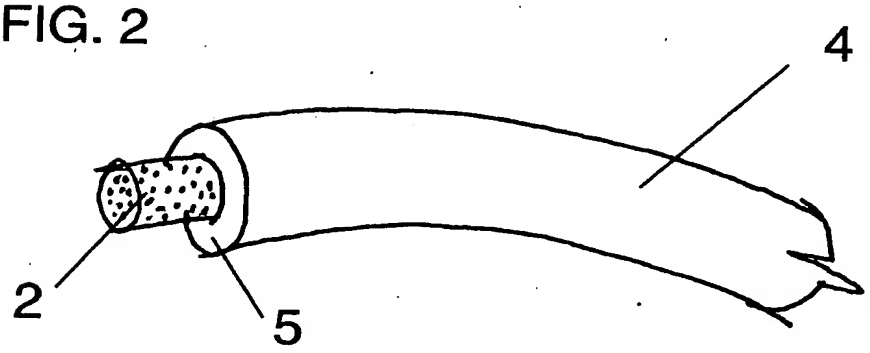

FIG. 3

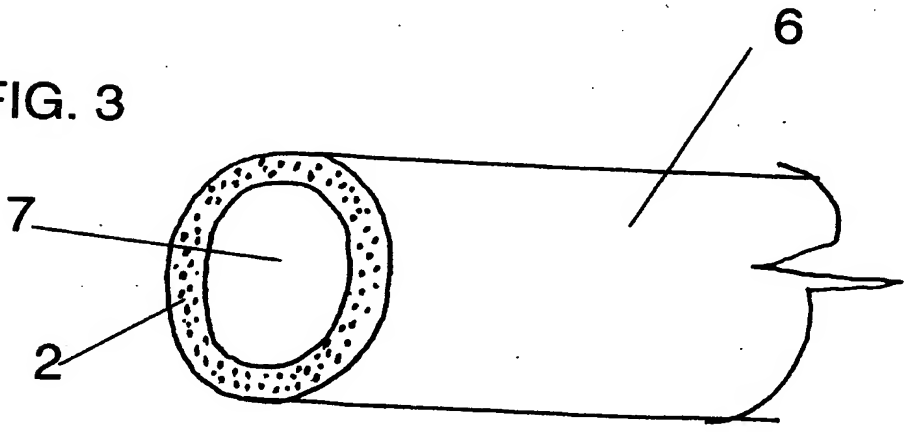

FIG. 4

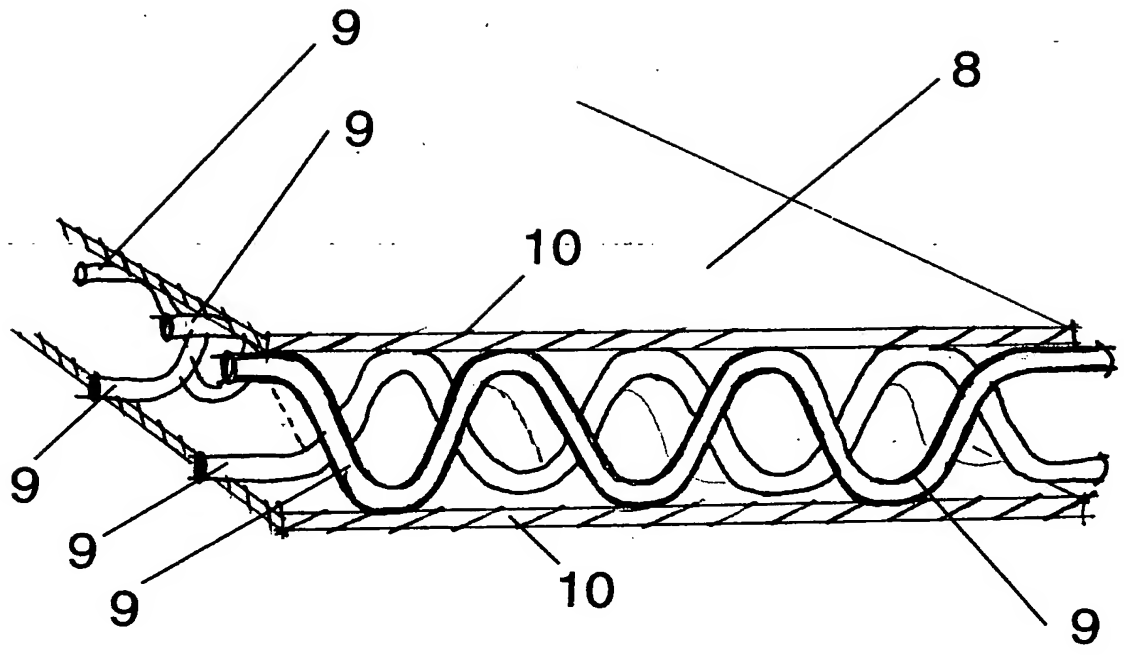

FIG. 5